Fourth Grade Mathematics

Standard 1: Students will acquire number sense and perform operations with whole numbers, simple fractions, and decimals.

Objective 1: Represent whole numbers and decimals in a variety of ways.
 a. Model, read, and write numerals from tenths to 100,000.
 b. Write a *whole number* up to 99,999 in *expanded form* (e.g., 76,539 is 7 ten-thousands, 6 one-thousands, 5 hundreds, 3 tens, 9 ones or 70,000+6,000+500+30+9).
 c. Identify the place and the value of a given digit in a five-digit numeral, including decimals to tenths.
 d. Demonstrate multiple ways to represent numbers by using models and symbolic representations (e.g., 36 is the same as the square of six, three dozen, or 9x4).
 e. Identify *square numbers* using models.

Objective 2: Identify relationships among whole numbers and decimals.
 a. Identify the number that is 100 more, 100 less, 1,000 more, or 1,000 less than any *whole number* up to 10,000.
 b. Compare the relative size of numbers (e.g., 100 is small compared to a million, but large compared to 5).
 c. Compare whole numbers up to five digits using the symbols <, >, and =.
 d. Identify a whole number that is between two given whole numbers.
 e. Order and compare whole numbers and decimals to tenths on a number line.

Objective 3: Model and illustrate meanings of the four operations and describe how they relate.
 a. Use models to represent multiplication of a one- or two-digit *factor* by a two-digit factor (up to 30) using a variety of methods (e.g., rectangular *arrays*, partial products, manipulatives, pictures) and connect the representation to an *algorithm*.
 b. Recognize that division by zero is not possible (e.g., 6÷0 is undefined).
 c. Select and write a multiplication or division sentence to solve a problem related to the students' environment and write a story problem that relates to a given equation.
 d. Represent division of a two-digit *dividend* by a one-digit *divisor*, including whole number remainders, using various methods (e.g., rectangular arrays, manipulatives, pictures) and connect the representation to an algorithm.
 e. Demonstrate that multiplication and division are *inverse operations* (e.g., 3x4=12; thus, 12÷4=3 and 12÷3=4).
 f. Describe the effect of place value when multiplying whole numbers by 10 and 100.

Objective 4: Use fractions to communicate parts of the whole.
 a. Divide *regions* and *sets of objects* into equal parts using a variety of models and illustrations.
 b. Name and write a fraction to represent a portion of a unit whole for halves, thirds, fourths, fifths, sixths, eighths, and tenths.
 c. Relate fractions to decimals that represent tenths.
 d. Determine which of two fractions is greater using models or illustrations.
 e. Find equivalent fractions for one-half, one-third, and one-fourth using manipulatives and pictorial representations.

Objective 5: Solve whole number problems using addition, subtraction, multiplication, and division in vertical and horizontal notation.
   a. Determine when it is appropriate to use estimation, mental math strategies, paper and pencil, or a calculator.
   b. Find the *sum* and *difference* of four-digit numbers and describe the process used.
   c. Multiply two- and three-digit *factors* by a one-digit factor and describe the process used.
   d. Divide a two-digit *whole number dividend* by a one-digit *divisor*, with a one-digit *quotient,* and a *remainder* of zero, and describe the process used.

Standard 2: Students will use patterns and relations to represent mathematical situations.

Objective 1: Recognize, describe, and use patterns and identify the attributes.
   a. Represent and analyze *repeating* and *growing patterns* using objects, pictures, numbers, and tables.
   b. Recognize and extend multiples and other number patterns using a variety of methods.

Objective 2: Recognize, represent, and solve mathematical situations using patterns and symbols.
   a. Solve equations involving equivalent *expressions* (e.g., 6x2= ~x3 or 6x~=9+9).
   b. Use the $<$, $>$, = symbols to compare two expressions involving addition, subtraction, multiplication, and division (e.g., 5x4◇9÷3).
   c. Recognize that a given variable maintains the same value throughout an equation or expression (e.g., ~+~=8; ~=4).
   d. Demonstrate that changing the order of *factors* does not change the *product* (e.g., 2x3=6, 3x2=6) and that the grouping of three or more factors does not change the product (e.g., (2x3)x1=6; 2x(3x1)=6).
   e. Demonstrate the distribution of multiplication over addition using a rectangular *array* (e.g., 8x14=8 rows of 10 plus 8 rows of 4).

Standard 3: Students will use spatial reasoning to recognize, describe, and identify geometric shapes.

Objective 1: Describe, identify, and analyze characteristics and properties of geometric shapes.
   a. Identify and draw *parallel lines* and *intersecting lines*.
   b. Identify and draw lines of symmetry on a variety of *polygons*.
   c. Identify and describe *quadrilaterals* (i.e., rectangles, squares, *rhombuses, trapezoids,* kites).
   d. Identify *right, obtuse,* and *acute* angles.
   e. Compare two polygons to determine whether they are *congruent* or *similar*.
   f. Identify and describe *cylinders* and *rectangular prisms*.

Objective 2: Specify locations and describe spatial relationships using grids and maps.
   a. Locate positions on a map of Utah using *coordinates* or *regions*.
   b. Give the coordinates or regions of a position on a map of Utah.

Objective 3: Visualize and identify geometric shapes after applying transformations.
  a. Identify a *slide* (*translation*) or a *flip* (*reflection*) of a geometric shape using manipulatives.
  b. Relate *cubes, cylinders, cones,* and *rectangular prisms* to the *two-dimensional* shapes (*nets*) from which they were created.

Standard 4: Students will understand and use measurement tools and techniques.

Objective 1: Identify and describe measurable attributes of objects and units of measurement.
  a. Describe the relative size (e.g., bigger than, smaller than) among *metric* units of length (i.e., millimeter, centimeter, meter), between metric units of volume (i.e., milliliter, liter), and between metric units of weight (i.e., gram, kilogram).
  b. Identify a mile as a measure of distance and its relationship to other *customary* units of length.
  c. Describe the relative size (e.g., bigger than, smaller than) among customary units of *capacity* (i.e., cup, pint, quart, gallon).
  d. Estimate length, capacity, and weight using metric and customary units.

Objective 2: Determine measurements using appropriate tools and formulas.
  a. Measure the length of objects to the nearest centimeter, meter, quarter-inch, foot, and yard.
  b. Measure *capacity* using milliliters, liters, cups, pints, quarts, and gallons and measure weight using grams, kilograms, and pounds.
  c. Read, tell, and write time to the nearest minute, identifying a.m. and p.m.
  d. Read and record the temperature to the nearest degree, in Fahrenheit, using a thermometer.
  e. Determine the value of a combination of coins and bills that total $20.00 or less.
  f. Count back change for a single-item purchase and determine the amount of change to be received from a multiple-item purchase.
  g. Determine possible *perimeters*, in whole units, for a rectangle with a fixed *area* and determine possible areas when given a rectangle with a fixed perimeter.

Standard 5: Students will collect and organize data to make predictions and use basic concepts of probability.

Objective 1: Collect, organize, and display data to make predictions and answer questions.
  a. Identify a question that can be answered by collecting data.
  b. Collect, read, and interpret data from tables, graphs, charts, surveys, and observations.
  c. Represent data using tables, line plots, line graphs, and bar graphs.
  d. Identify and distinguish between *clusters* and *outliers* of a data set.

Objective 2: Use basic concepts of probability.
  a. Describe the results of investigations involving random outcomes as simple ratios (e.g., 4 out of 9, 4/9).
  b. Predict outcomes of simple experiments, including *with and without replacement*, and test the predictions.